Arizona Department of Health Services
Division of Public Health Services

Cancer Rates According to Community Health Analysis Areas (CHAAs)

Questions and Answers

About the CHAAs

1) What is a Community Health Analysis Area (CHAA)?
   - A CHAA is a geographic unit in Arizona. The ADHS Bureau of Public Health Statistics created these units for use by various disease monitoring programs. The map of Arizona contains 126 of these units.

2) Why did ADHS create CHAAs?
   - In 1988, the Arizona legislature directed ADHS to use the data in the cancer registry to identify areas and populations that need investigation. Until recently, the state-collected cancer data was not complete enough to looks at rates on a relatively small geographic scale, limiting analysis to the county level only.
   - Now, however, the cancer registry has accumulated enough cases, covering enough years, to meet the legislative mandate to report on rates across the state. We developed CHAAs to present our data at a geographic scale smaller than the county level.

3) How did ADHS create CHAAs?
   - The ADHS created CHAAs by modifying the Primary Care Areas (PCAs) used by the ADHS program for Health Systems Development. PCAs have been used to characterize the health needs of communities for many years; however, the PCAs did not quite provide all the coverage and detail that we require. For disease monitoring purposes, the CHAAs are an improvement over the PCAs because CHAAs more closely align to the growing rural communities and to Phoenix's villages. The Year 2000 Census also created problems with the boundaries of PCAs that were corrected by creating the CHAAs.

4) What are CHAAs based on?
   - A CHAA is built from US 2000 Census Block Groups. These Block Groups are relatively small geographic regions of the state. A typical CHAA contains approximately 21,500 residents. But, because of the scattered pattern of development in Arizona they range widely in population, from 5,000 to 190,000 persons. The use of the relatively small Block Groups gives us the ability to aggregate data at a variety of sizes, from the Block Group level up to the CHAA level that we use in analysis. A CHAA in the highly urbanized areas of Maricopa County contains approximately 100,000 persons. The average rural CHAA contains approximately 10,000 persons.

5) Why are CHAAs better than using zipcodes as the unit of analysis?
   - Zip codes are a tool for delivering mail. They have no fixed boundaries and they are changed to efficiently move mail when populations grow. In fact, some zip codes have

no boundaries at all (eg, Post Office Boxes). States with stable populations (i.e., not growing) are able to use zip codes for community analysis. Although the public understands the concept of zip codes, fast growing Arizona zip codes are constantly changing making them a poor choice for analyzing Arizona communities. CHAAs, on the other hand, have fixed unchanging boundaries and a population size large enough to do analysis, but small enough to represent a community.

6) How does the Cancer Registry assign a location for an individual case?

- In simple terms, a computer program translates a patient's address to a location on the map. The CHAA that corresponds to that location is then used for that case.

Some readers may wish to know the technical description of this crucial and complicated task.

- A computer program reads each case's address (number, direction, street name, city, state, and zipcode) and tries to assign its latitude and longitude on the earth. This step is called "geocoding the address."
- The addresses of the residences of each year's data were first geocoded using the Centrus Desktop geocoding software. Approximately 75% of each year's records could be assigned (geocoded) to an exact address point. The addresses that could not be geocoded to an address point were processed in ArcView using a geocoding service built from the Census Bureau's 2002 TIGER/Line file. Addresses were accepted as geocoded to the address level when they had at least an 80% address match score in ArcView.
- After the first round of geocoding, the addresses of cases not geocoded were imported into a database where they could be manipulated, queried, and reviewed for address errors. After making corrections to incorrect addresses, the database was run through the Centrus geocoding program once again. The remaining records that contained valid addresses but didn't geocode to the address level then were geocoded using custom built ArcView composite geocoders.
- Records again were examined to determine whether they had been geocoded to at least the CHAA level. For cases that had not been geocoded to the CHAA level using the steps described above, ArcView was used to apportion cases to a CHAA based on the number of miles of streets in the zipcode or town that overlay the CHAA.

7) How do we count persons who give only a "P.O. Box" as their address?

- Rural area cases whose address was a PO box were assigned to a CHAA based on the town of residence or with geospatial statistical methods. Metro Phoenix and Tucson area cases with PO boxes or only zipcode-level addresses were not assigned a CHAA.

8) What percentage of cases did not get placed into a CHAA?

- About 2 percent of cases did not get placed in a CHAA. Most of these cases had a PO box in an urban area or had an invalid address that could not be placed on the map. For each cancer site (eg, prostate, breast) the last line of the data table tells the reader how many cases could not be placed into a CHAA.

9) How did we select the cancers for display?

- We chose these 13 cancers because of their public health implications. Cancers of many sites can be prevented (e.g., colorectal; tobacco-related cancers such as oral, lung, bladder, cervix; mesothelioma; melanoma of skin). Also, cancer screening can detect many tumors in early, curable stages (e.g., colorectal, oral, skin, cervix, breast, prostate). The opportunities for public health intervention are described further in the Arizona Comprehensive Cancer Control Plan <www.azdhs.gov>.
- For other cancers (i.e., brain, child leukemia, kidney, multiple myeloma), there are no current public health interventions. For example, for childhood leukemia there is no known preventive measure, and we know very little about the causes. Due to the public interest in these cancers, they are also included in this analysis. For these cancers we are encouraging cancer researchers to identify opportunites for intervention.

10) What are the limitations of using CHAAs?

- The CHAAs provide statistically sound data for the more common cancers (e.g., breast, lung, colorectal, prostate) but their use may be more limited in analysis of relatively uncommon cancers (e.g., leukemia, mesothelioma, myeloma), where the small number of cases limits statistical analysis.

About case counts and reports

11) Where do the case counts ("numerators") come from?

- The Arizona Cancer Registry receives reports of cancer cases from hospitals, cancer clinics, and doctors. These reports include information on the cancer, such as the origin of the tumor within the body (or the *site*), as well as demographic information on the patient such as address, age and gender. The Arizona Cancer Registry relies on these reporting sources to report all of their cancer cases so the most accurate information can be provided about the cancer cases within the state of Arizona. These case counts provided by the central registry comprise the numerators for the data tables.

12) Can a person have more than one case of cancer?

- Yes. If a person with one cancer develops a second cancer at a different site, then that would be counted as a second case. However, if a person has a spread (metastasis) of the original cancer, then this case will be counted in the registry only one time according to the primary site.

13) What is the most recent year of cancer statistics?

- The most recent, complete year is 2002. There are approximately 22,000 new cancer cases diagnosed each year in Arizona. The Arizona cancer registry receives reports from over a hundred hospitals and clinics and several hundred physicians. It takes at least 18 months after the end of the calendar year to verify that all the information was reported as accurately as possible, and that a case was counted only once.
- In recognition of its high quality data for the 2002 data year, the Registry has received Silver Certification by the North American Association of Central Cancer Registries.

14) Where do the population numbers ("denominators") come from?

- Information from the US Census (www.census.gov) is used for this analysis. The US Census counts the numbers of all US residents every 10 years, at the beginning of each decade (1990, 2000, etc). The US Census also collects demographic information such as age, gender and race.
- For each year between the decennial census we interpolate the number of residents. These estimates work well for stable geographic areas whose population counts are stable. However, these population estimates may be less reliable for those areas that are rapidly growing, such as the developing outskirts of the major cities.

15) I believe there were more cases in my community than the data show. Why is there a difference?

There are several possible reasons:

- A recently diagnosed cancer case will take time before it appears in our published data. It takes at least 18 months for the central registry to check that the information was reported as accurately as possible. You may be referring to cases that were diagnosed in a more recent time period than the time frame shown in the data presented here.
- Cases are counted according to their official place of residence when diagnosed, as reported by the hospital or physician to the Cancer Registry.
- Cancer cases are counted according to the body site where the tumor first started to grow; therefore, secondary sites of an original cancer are not counted.
- It is possible that data regarding the case was incomplete or incorrect when entered into the Cancer Registry. (see Question 6))
- It is also possible that a cancer facility or healthcare provider did not report the case to the Registry. It is estimated that the Registry contains at least 93% of all cancer cases in the state. Therefore, it is estimated that seven percent of cancer cases are missing from the Registry.

16) What is an "age-adjusted" rate?

- Rates, in a general sense, give us an idea of the proportion, or a percentage, of a population that is affected by a disease. The rate is the number of people, generally for each 100,000 persons in the population, who have the disease. If two populations are different in size then it cannot be determined, simply by looking at the count of cases, which population is more affected by a disease. By calculating a rate, the proportion of each population that has the disease can be determined. Calculating a rate in this manner provides a *crude rate*.
- However, unless the rates are *adjusted*, the two populations cannot be compared to each other to determine which has the higher rate. This is because the proportions of age groups may differ between populations. For example, if City "A" were a retirement community, but City "B" contained mostly young families, then this difference in ages between these two populations would need to be considered. *Age-adjusted rates* allow a comparison of rates across communities.

- So, it is important to remember that *crude rates* will tell you the proportion of a population that is affected by a disease, whereas *age-adjusted rates* are used to compare two or more populations.

17) How often will additional data be added?
- The Arizona Cancer Registry plans to update the data for these tables about every two years. Combining data across years protects the confidentiality of cases and provides more reliable reports about small areas.

18) How do I ask for tables of cancer sites other than the ones shown?
- Data requests may be submitted to the Data Section of the Arizona Cancer Registry by calling (602) 542-7328. The amount of time it takes to complete these requests is dependant upon how complex the request is to fill, and how many other requests and projects the Registry staff is currently working on.

Interpreting Data

19) Why do CHAA rates vary?
- There are several ways that CHAA rates vary. They vary with respect to other CHAAs and they vary from cancer to cancer. It is important to understand that higher rates do not necessarily imply that something in a specific area is causing more cancer. Higher numbers of cancer cases occur by chance far more often than they occur from a causal factor in the community. Any natural event will have a tendency to group rather than occur in a perfectly random pattern. An example may be leaves falling from a tree. It may look like the leaves have fallen in a random pattern in the yard, but on closer inspection you will find that there are areas that have larger numbers of leaves than other spots in the yard.
- Not knowing what causes certain cancers in the first place is a major obstacle in not understanding the variation of cancer rates in different areas. For many cancers, little is known about the causes, and, therefore, science is currently unable to explain the variation of numbers of cases from one area to another. These cancers may have behavioral, environmental, and/or genetic causes that are yet to be discovered.

20) Is my CHAA rate different from the state rate?
- Even though your CHAA rate may be higher than the state rate numerically it may not be truly different from the state rate. Because the population and counts for each CHAA are so different, it requires a statistical process to identify CHAA rates that are higher or lower than the state rate. This is why Confidence Intervals are calculated. If the lower confidence bound (the first number in the Confidence Interval) for your CHAA rate is higher than the state rate then the CHAA rate is truly higher. Conversely, if the higher confidence bound (the second number in the Confidence Interval) is lower than the state rate, then your CHAA is truly lower than the state rate. If neither of these is true then your rate is not statistically different from the state rate.

21) Why does the Department refer to "elevated cancer rates" instead of using the term "cluster?"

- The term "cluster" is often misunderstood and used incorrectly. The epidemiologists at the Arizona Cancer Registry use the term "elevated cancer rate," which more clearly indicates what the data here represent.
- Essentially "elevated cancer rates" are those rates that are significantly higher than the overall state rate. This does not necessarily indicate "clustering", which is a term that links time and distance between cases.
- "Elevated cancer rates" may or may not reflect behaviors, genetic make-up, and/or environmental factors in a community.

22) Am I at risk if my area has a high rate?

- There are no studies that have shown residential location to be a major risk factor for any type of cancer. Very few cancers are simply a result of environmental factors. Nevertheless, environmentally-linked cancers have been identified in some workplace settings where cancer-causing agents were present. For example, insulation workers were identified with mesothelioma, a cancer caused by asbestos. Risk is more often a result of lifestyle (if you smoke or have bad nutrition) or genetic factors, or a combination of both.

23) Where can I find more information about the geography of cancer?

- NCI cancer maps
  http://www3.cancer.gov/atlasplus/
- CDC cancer maps
  - http://www.cdc.gov/cancer/npcr/uscs/2001/users_guide/figures.htm
- NAACCR annual report
  - http://www.naaccr.org/index.asp?Col_SectionKey=11&Col_ContentID=49

24) What is the role of the Cancer Registry in assessing areas of high or low cancer rates?

- The authorizing statute (A.R.S. 36-133) directs the Registry to monitor incidence patterns, and to identify regions of the state that need epidemiological research. Although the cancer registry is funded to produce cancer rates for the state, no funding or resources are provided to conduct detailed investigations or research of areas with high or low rates.
- The Registry serves as a resource to the research community for studying causes of cancer and may authorize others to use the data for that purpose.

25) Regarding the assessment of cancer rates, what is the difference between a public health response and research?

- The long-established role of a public health department is to inform the public about the known factors that may explain the differences in rates in regions of the state. For example, it is appropriate for ADHS to call attention to the role that tobacco use may play in elevating the rate of lung cancer. This is straightforward when a lot is known about the cause of a particular cancer.

- However, when the underlying cause is largely unknown, the situation is problematic. This is the case for most childhood cancers. Limited funding precludes the department from conducting basic research or costly studies. However, we encourage our colleagues in the academic setting to use our data to conduct this needed research.

26) How does ADHS plan to evaluate unexplained, elevated rates shown on the CHAA maps and tables?

- If the number of cases of a type of cancer appears unusually high for a community, the ADHS follows an established protocol. The ADHS's primary responsibility is to the public's safety. If the assessment reaches a point where scientific research is needed, ADHS will consult with the Centers for Disease Control and Prevention in Atlanta for assistance or may also partner with academic researchers in Arizona to assist.
- The ADHS plans to work with participants in the Arizona Comprehensive Cancer Control Plan <CCC Plan> to identify opportunities to intervene and reduce the incidence rates. Participation from the local communities will be an important component of this Plan.
- Production of this website is the first step toward educating the local communities and the public about the occurrence of cancer.

27) If further evaluation is needed for a community with an unusually high rate of a specific cancer, who would or should conduct this?

- The ADHS is directed by law to look at the rates of cancer in Arizona and identify communities with high rates. However, it is not funded to conduct extensive studies in these communities. There is a protocol that ADHS uses to determine what should be done if an unusually large number of a specific cancer is found in a community.

28) What should I do if I think there is a problem with cancer in my town?

- There are three things to consider first if you believe you have identified this problem. First, cancer is a common disease -- the National Cancer Institute reports that 46% of males, and 38% of females will be diagnosed with a cancer in their lifetime. Second, cancer is more common in the older age groups. If an area has a large number of elderly people it would be expected to have more cancer cases. And third, for there to be a problem in your area that is causing cancer, the cancer cases would be the same **type** of cancer. Different types of cancer have very different causes. If you still feel there is a problem, contact the Arizona Cancer Registry at (602) 542-7320.

29) Which other states have produced cancer rates for small areas?

- New York State
  - http://www.health.state.ny.us/nysdoh/cancer/csii/nyscsii.htm
- Kentucky
  - http://www.kcr.uky.edu/

- North Carolina
  - http://www.schs.state.nc.us/SCHS/

- Vermont
  - http://www.healthyvermonters.info/hs/epi/cdepi/cancer/registry/cancerreg.shtml

30) I see some quite high CHAA rates. What does that mean?

- Very high rates are usually the result of very small counts in areas with very small populations. When counts show fewer than 10 cases the rates are not considered statistically reliable. This means that very high rates could occur during one period of time and very low rates during another period of time, with only a difference in a few cases. It is always important to look at the count of cases as well as the case rates for true perspective.

Cancer and its causes

31) What is cancer? What causes cancer? Can cancer be cured?

- Cancer is a group of diseases characterized by uncontrolled growth and spread of abnormal cells.
- Cancer may be caused by a variety of factors.
  - External factors: chemical, tobacco smoke, radiation, and viruses
  - Internal factors: hormones, immune conditions, and genetics
  - Lifestyle factors: tobacco and alcohol use, unprotected sun exposure, poor nutrition, and physical inactivity
- Scientists continue to study cancer because in many cases little is known about the causes.
- Modification of lifestyle factors, especially the avoidance of tobacco, will lower your risk of developing a cancer.
- If detected and treated promptly many cancers can be cured. The current treatment of cancer may include surgery, radiation, chemotherapy, hormones, and immunotherapy.

32) How common is cancer?

- According to the American Cancer Society, in the United States, approximately one in two men and one in three women will develop cancer in their lifetimes. Cancer will affect two of every three families in America.

33) Which are the most common cancers?

- Skin cancer is the most common cancer in the United States. The ADHS recently worked with the American Cancer Society in producing a statistical report on cancer in Arizona (see http://www.azdhs.gov/phs/phstats/acr/pdf/azfactsandfigures.pdf) that includes the ten leading cancers.

The ten leading cancers in Arizona are:	
MALES	**FEMALES**
Prostate	Breast
Lung and Bronchus	Lung and Bronchus
Colon and Rectum	Colon and Rectum
Urinary Bladder	Uterus
Melanoma of the Skin	Lymphoma
Lymphoma	Ovary
Kidney & Renal Pelvis	Melanoma of the Skin
Oral Cavity	Urinary Bladder
Leukemia	Pancreas
Pancreas	Thyroid

For more information about cancer or cancer reporting see:

- ADHS, Arizona Cancer Registry Program at http://www.azdhs.gov/phs/phstats/acr/index
- American Cancer Society at http://www.cancer.org
- American College of Surgeons Commission on Cancer at http://www.facs.org/cancer
- Centers for Disease Control and Prevention at http://www.cdc.gov/cancer
- Centers for Disease Control and Prevention National Program of Cancer Registries at http://www.cdc.gov/cancer/npcr
- National Association of Central Cancer Registries at http://www.naaccr.org
- National Cancer Institute at http://www.nci.nih.gov
- National Cancer Institute SEER Program at http://www.seer.cancer.gov

34) Are there factors that elevate the rates of every cancer?

- Scientists who study cancer have identified few factors that elevate the rate of nearly every cancer site; cigarette smoking and radiation are two noteworthy examples that do.
- A good source of information about the causes and possible causes of specific cancers is the National Cancer Institute's website http://www.cancer.gov/cancertopics/prevention-genetics-causes

35) Does pollution cause cancer?

- Scientists say "yes," but it has been very difficult to establish a direct link between pollution and elevated rates in the general population. The major challenge in establishing this link is scientist's inability to document exposure to pollution. Only now are the laboratory tests to measure trace amounts of chemicals in the environment and in people becoming technologically feasible. In most situations government agencies are reluctant to fund this expensive step except in very selective research settings. Also, Americans are highly mobile, so using a family's residence as a surrogate measure of exposure is not an accurate way to categorize exposure.
- The best estimate is that pollution causes 2% of cancer deaths nationally (Doll and Peto. JNCI 1981; 66(#6):1256).

36) How long does it take to develop a cancer?

- Many cancers in adults are thought to take 10-40 years to develop.
- Cancers occur at all ages. In general, the cancer rate increases as people get older.
- Genetic factors play a role, but this can be influenced by our lifestyle, habits, reproductive history, and job exposures.
- In smokers, lung cancer rates are dose-dependent: the cancers occur sooner if the exposure starts at young ages, or the heavier the amount smoked.
- The origin of childhood cancer is not well known. It may occur spontaneously, or result from a combination of inherited and unknown environmental factors

37) What causes specific cancers?

- For an *individual* case of cancer, it is rarely possible to attribute a cause. Rather, the discipline of public health looks at the factors that increase the risk to *whole populations or groups*. For example, smoking causes lung cancer, but so do other factors. Some individuals smoke a lifetime and do not develop cancer. Some persons never smoke and get lung cancer. But, for the greater population, multiple studies allow scientists to conclude that smoking causes lung cancer. About 80% of the lung cancers that occur in the US are due to tobacco. The other 20% are attributed to other causes, including the category of "unknown" causes. Even for an individual case of lung cancer, it is difficult to identify a single cause.
- A good source of information about the causes and possible causes of specific cancers is the National Cancer Institute's website http://www.cancer.gov/cancertopics/prevention-genetics-causes
- The National Toxicology Program's *Report on Carcinogens* contains technical information about specific chemicals and agents (see http://ehis.niehs.nih.gov/roc). Links to the known agents are found at http://ntp.niehs.nih.gov/ntp/roc/eleventh/known.pdf .
- The ADHS relies heavily upon these sources for the information that is provided to the public and local communities about the causes of cancer.

38) Why is investigating cancer different than investigating infectious disease?

- Scientists have made much more progress in understanding infectious diseases than cancer. For the last hundred years, scientists have used the microscope and newer technologies to determine the microbial causes of nearly all infectious diseases. On the other hand, scientists are learning that cancer is much more complicated. Scientists are only just starting to learn about the cellular and molecular disruptions that cause cancer. Cancer science is even less advanced when it comes to knowing the genetic and environmental interactions that cause disease. Consider how these factors play a role in cancer:

Category of causes	Examples
Chromosomal	Trisomy 21 (Down Syndrome) and leukemia
Genetic	BRCA1 and breast cancer HNPCC and colorectal cancer
Occupational	Asbestos worker and mesothelioma
Endocrine	Estrogens and endometrial cancer
Metabolic	Obesity and colorectal cancer
Dietary	Fruits and vegetable protect against colon cancer
Environmental	Second hand cigarette smoke and lung cancer
Infectious	Viral hepatitis and liver cancer

39) Where can I get more information about cancer clusters? See the CDC website http://www.cdc.gov/nceh/clusters/about_clusters.htm .

40) Where can I find more cancer statistics?
http://surveillance.cancer.gov/statistics/tools/what_tool.html

41) Now that the CHAA data is posted, what should happen next?
- Local communities should use the tables for planning cancer prevention and early detection programs.
- Health organizations also should use the data to target cancer intervention programs.
- The research and academic communities should use the data to identify opportunities to further study cancer causes and care.
- The universities in Arizona can bring their technical expertise in statistics and GIS mapping to bear on the cancer data.

42) What can I do personally to prevent or control cancer?
- Seek out and volunteer to participate with local health or community organizations that are active in cancer prevention or care.
- Follow the Surgeon General's recommendations that promote wellness. <Link to healthfinder.gov>
- For specific recommendations please visit these websites:
  - American Cancer Society, www.cancer.org
  - National Cancer Institute, Prevention
  - Cancer Research and Prevention Foundation, Healthy Living

<end of document>